## **CLAIMS:**

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- 1. A solid state lasing structure, comprising a field effect transistor in which source and drain electrodes are disposed on semiconducting material forming an active layer on a gate whereby current between the source and drain electrodes defines and flows along a channel in said active layer to define a recombination and emission zone, said active layer comprising a semiconducting light emitting organic polymer.
- 2. The lasing structure of claim 1 including a gate insulator between the gate and the light emitting organic polymer.
- 3. The lasing structure of claim 1 in which said gate is supported on a glass substrate.
- 4. The lasing structure of claim 1 in which said gate is supported on a silicon substrate with SiO<sub>2</sub> on top of the silicon.
- 5. The lasing structure of claim 1 in which the index of refraction of said light emitting organic polymer and of said gate are greater than the index of refraction of said gate insulator.
- 6. The lasing structure of claim 3 in which the index of refraction of said light emitting organic polymer and of said gate are greater than the index of refraction of said gate insulator and said glass substrate.
- 7. The lasing structure of claim 1 in which said gate is formed of indium-tin-oxide.
- 8. The lasing structure of claim 2 in which said gate insulator is SiO<sub>2</sub>.

- 9. The lasing structure of claim 1 in which said light emitting organic polymer has a 4-level lasing energy system.
- 10. The lasing structure of claim 1 including an additional layer of semiconducting organic polymer between said source and drain electrodes and said light emitting organic polymer being formed with an n doped region in contact with said source electrode, a p doped region in contact with said drain electrode, and an i region therebetween forming a p-i-n junction.
- additional layer of organic polymer contains polycations and counteranions and said n and p doped regions have been formed by applying a source-drain voltage while said additional layer is heated to an elevated temperature and for a time sufficient to mobilize the counteranions whereby said n doped and p-doped regions and p-i-n junction are formed upon cooling of the additional layer.
- 12. The lasing structure of claim 1 in which said structure is formed to be resonant with feedback whereby to generate coherent laser light.
- 13. The lasing structure of claim 12 comprising Bragg reflectors on opposite sides of said channel.
- 14. A solid state lasing structure, comprising a field effect transistor formed of:

a solid, semiconducting light emitting organic polymer; source and drain electrodes disposed on one side of said light emitting organic polymer;

a gate on the opposite side of said light emitting polymer, defining an active layer in said light emitting polymer whereby

current between the source and drain electrodes flows along a channel in said active layer to define a recombination and emission zone;

a gate insulator between the gate and the light emitting organic polymer; and

a glass substrate supporting said gate;

the index of refraction of said light emitting organic polymer and of said gate being greater than the index of refraction of said gate insulator and said glass substrate.

15. A solid state lasing structure, comprising a field effect transistor formed of:

a solid, semiconducting light emitting organic polymer having a 4-level lasing energy system;

source and drain electrodes disposed on one side of said light emitting organic polymer;

an indium-tin-oxide gate on the opposite side of said light emitting polymer, defining an active layer in said light emitting polymer whereby current between the source and drain electrodes flows along a channel in said active layer to define a recombination and emission zone;

a SiO<sub>2</sub> gate insulator between the gate and the light emitting organic polymer; and

a glass substrate supporting said gate;

the index of refraction of said light emitting organic polymer and of said indium-tin-oxide gate being greater than the index of refraction of said SiO<sub>2</sub> gate insulator and said glass substrate.

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